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EXAMINER	
CHAN, ALEX H	
ART UNIT	**PAPER NUMBER**
2633	5

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/810,881	HAIT, JOHN N.
	Examiner	Art Unit
	Alex H Chan	2633

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 16 March 2001.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-17 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-17 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 16 March 2001 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: 56b and 15 of Fig. 9, 56 of Fig. 10. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. **Claims 1-4 and 10** are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,909,297 to Ishikawa et al (hereinafter Ishikawa) in view of U.S. Patent No. 5,541,755 to Noe et al (hereinafter Noe) or U.S. Patent No. 5,594,577 to Majima et al (hereinafter Majima).

Regarding claim 1, Ishikawa discloses an apparatus for detecting wavelength errors (e.g. measuring bit-error rates at each wavelength or Q value, Col. 12, line 44-Col. 13, line 47), the apparatus comprising a photonic input path (e.g. via 84 of Fig. 8) configured to carry a photonic input signal (i.e. output light, Col. 13, lines 60-62) having a wavelength; a modulation synthesizer (e.g. combination of 67a and 67b of Fig. 8) configured to provide first and second modulation waveforms (e.g. generating modulation signals synchronized to clock signals, Col. 13, line 66-Col. 14, line10); first and second modulation devices (66a and 66b of Fig. 8) configured to modulate the photonic input signal with the first and second modulation waveforms, respectively (Col. 14, lines 11-31), thereby providing first and second modulated photonic signals (e.g. outputs of 66a and 66b of Fig. 8, Col. 14, line 17); the first and second modulation waveforms configured to produce a wavelength offset (e.g. outputting modulated signals with different phases, Col. 14, line 18 or out of phase with respect to each other, Col. 14, lines 23-26) between the first and second modulated photonic signals; a filter apparatus (e.g. 71 of Fig. 8 or combination of 92a and 92b of Fig. 9) configured to filter the first and second modulated photonic signals (Col. 14, lines 37-39), thereby providing first and second filtered photonic signals (Col. 15, lines 11-13);

Though Ishikawa discloses a differential detector (e.g. combination of 73a, 73b and 74 of Fig. 8 or 9) configured to receive the first and second filtered photonic signals, Ishikawa fails to disclose a differential detector that provides a wavelength error signal proportional to the difference in intensity therebetween. Noe discloses a differential detector (5 of Fig. 1) that provides a wavelength error signal (FS of Fig. 1) proportional to the difference in intensity therebetween (e.g. the detector signal, which generates the error signal, is proportional to power

of the superposition signal (Col. 8, lines 35-40, Col. 3, lines 34-41, and Col. 5, line 37-Col. 6, line 6). Likewise, Majima also discloses a differential detector (e.g. combination of 1-4-1, 1-4-2 and 1-6 of Fig. 5) that provides a wavelength error signal (Fig. 2 and Col. 3, lines 47-48) proportional to the difference in intensity therebetween (e.g. Fig. 11A-C and 14, Col. 3, lines 38-44 and Col. 4, lines 49-56). Accordingly, one of the ordinary skilled in this art would have been motivated to employ a differential detector to provide wavelength tracking for producing an error signal from the phase relation between the modulated component and the modulated signal (Col. 6, lines 36-44 and Col. 10, lines 18-51, Majima). Therefore, it would have been obvious to one of artisan from the same field of endeavor skilled in the art to modify the drift compensating circuit for optical modulators in an optical system of Ishikawa by incorporating a differential detector because Majima suggests that this provides wavelength tracking for producing error signal indicative of the phase relation between the modulated component and the modulated signal.

Regarding claim 2, Ishikawa discloses first and second photonic output paths (e.g. output paths of 66a and 66b of Fig. 8 or of 201_1 and 201_2 of Fig. 61) configured to carry the first and second modulated photonic signals, respectively; and the filter apparatus further configured to direct the first and second modulated photonic signals substantially through the same physical region of the filter apparatus (e.g. the same physical region which 92a and 92b of Fig. 9).

Regarding claim 3, Majima discloses differential detector is physically adjacent to the filter apparatus (e.g. differential detector (combination of 1-4-1, 1-4-2 and 1-6 of Fig. 5) are physically adjacent to filter apparatus (e.g. 1-2-1 and 1-2-2 of Fig. 5)).

Regarding claim 4, Majima discloses a Bragg filter (Col. 26, lines 1-3).

Regarding claim 10, Ishikawa discloses the first and second modulation devices comprise phase modulation (e.g. modulating portions capable of subjecting output lights to phase modulation via 108 of Fig. 22 and Col. 19, lines 4-11)

4. **Claim 5** is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishikawa and Majima as discussed in claim 1 above, and further in view of U.S. Patent No. 6,335,814 B1 to Fuse et al (hereinafter Fuse).

Regarding claim 5, Ishikawa in view of Majima fails to disclose a shift input line configured to carry a shift signal; and the first and second modulation waveforms further configured to shift the wavelengths of the first and second modulated photonic signals with respect to the wavelength of the photonic input signal, in proportion to the shift signal. Fuse discloses a shift input line (e.g. input to 100 of Fig. 4, Col. 18, lines 63-67) configured to carry a shift signal (e.g. FM or PM or FSK or PSK signal, Col. 1, lines 31-35 and Col. 40, lines 31-45);

and the first and second modulation waveforms further configured to shift the wavelengths (e.g. by performing predetermined optical phase modulation on the un-modulated light outputted from 201 with the FM signals outputted from the FM portion 100 of Fig. 4, Col. 19, lines 5-15 and the phase of each FM signal is set to a phase which enlarges an optical-amplitude-modulated component, Col. 25, lines 18-26) of the first and second modulated photonic signals with respect to the wavelength of the photonic input signal in proportion to the shift signal (e.g. signal uniquely corresponds to the variations in frequency of the FM signal, Col. 22, lines 47-65). Accordingly, one of the ordinary skilled in the art would have been motivated to incorporate the above means as taught by Fuse to reduce the significant deterioration of quality of modulated/demodulated signal, which in turns minimize the degradation of the economy of overall system (Col. 2, lines 36-40 and lines 56-61). Therefore, it would have been obvious to one artisan from the same endeavor to modify the drift compensating circuit for optical modulators in an optical system of Ishikawa in view of Majima by employing a shift input line and shifting the wavelengths of the modulated photonic signals with respect to the input signal in proportion to the shift signal because Fuse suggests that this would improve the quality of the modulated/demodulated signal which also enhance the economy of the overall system.

5. **Claims, 6-9** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishikawa in view of Majima and Fuse as discussed in claim 5, and further in view of U.S. Patent No. 6,026,116 to Heidemann et al (hereinafter Heidemann).

Regarding claims 6-9, Ishikawa in view of Majima and Fuse fails to teach that the shift signal is characterized by a spreading function, a gathering function or that the shift signal comprises an allowable range of wavelength shifts, respectively. Heidemann discloses a shift signal (e.g. broadband signal generated by spreading function generator SG1 of Fig. 2 for PSK or FSK modulation, Col. 9, lines 16-21) is characterized by a spreading function, a gathering (i.e. despreading) function (e.g. via DSP of Fig. 6 or by multiplying the spreading functions, and Col. 6, lines 28-31 and Col. 3, lines 41-42) or by the differences of two spreading functions (e.g. via TP of Fig. 2 by blocking frequency ranges outside the frequency range of the received, despread broadband signals, Col. 5, lines 55-59 or by selecting the frequency values (spectral zeros having spread function) with the greatest amplitudes and/or intensities and passes only these frequency values, Col. 4, line 63-Col. 5, line 6) or that the shift signal comprises an allowable range of wavelength shifts (e.g. via NG1 of Fig. 2 where at least one spectral zeros is located in the frequency range of the broadband signal, Col. 4, lines 20-34). Accordingly, one of the ordinary skilled in the art would have been motivated to incorporate the above broadband-signal characterization as taught by Heidemann for the purpose of generating a spreading function for a pseudorandom 0/180° phase shift keying or frequency shift keying modulation which are less susceptible to degradation in signal-to-noise performance (Col. 1, lines 34-37). Therefore, it would have been obvious to one artisan from the same endeavor to modify the drift compensating circuit for optical modulators in an optical system of Ishikawa in view of Majima and Fuse by employing the above shift signal characterization because this helps to reduce the degradation in signal-to-noise performance.

6. **Claim 11** is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishikawa in view of Majima as applied to claim 1 above, and further in view of U.S. Patent No. 6,525,857 b1 to Way et al (hereinafter Way).

Regarding claim 11, Ishikawa in view of Majima fails to teach that the first and second modulation devices comprise quadrature amplitude modulators. Way teaches that the first and second modulation devices (54 and 56 of Fig. 4C) comprise quadrature amplitude modulators (Col. 1, lines 35-37 and Col. 5, lines 30-35). Accordingly, one of the ordinary skilled in the art would have been motivated to incorporate quadrature amplitude modulators because they are spectrally efficient for low bit-rate channels (Col. 5, lines 28-30). Therefore, it would have been obvious to one artisan from the same endeavor to modify the drift compensating circuit for optical modulators in an optical system of Ishikawa in view of Majima by employing quadrature amplitude modulators for the first and second modulation devices to provide a spectrally efficient optical transmission system.

7. **Claims 12-17** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishikawa in view of Majima and Way as applied to claim 11 above, and further in view of U.S. Patent No. 6,341,031 B1 to McBrien et al (hereinafter McBrien).

Regarding claim 12, Ishikawa in view of Majima and Way discloses the quadrature amplitude modulators (54 and 56 of Fig 4C or Fig. 5C or 116 of Fig. 7, Way) comprises an upper branch (branch in which λ_1 travels, Fig. 5C) and lower branch (branch in which λ_2 travels, Fig. 5C), the first and second modulation waveforms being quadrature waveforms (Col. 6, lines 19-

20) comprised of upper and lower waveform components corresponding to the upper and lower branch, the upper and lower waveform components being substantially 90 degree out of phase (Col. 6, lines 15-19), but fails to disclose that each branch having a transfer function. McBrien discloses that each branch having a transfer function (e.g. 166 of Fig. 3 has a transfer function of E1 whereas 168 has a transfer function of E2 where E represents the transfer function, Col. 7, lines 1-3 and lines 20-35). Accordingly, one of the ordinary skilled in the art would have been motivated to incorporate an upper and lower branch having transfer function for the purpose of illustrating the relationship between the applied modulation signal and the output intensity of Mach-Zehnder interferometer (e.g. Fig. 2b and Col. 5, lines53-55). Therefore, it would have been obvious to one artisan from the same endeavor to modify the drift compensating circuit for optical modulators in an optical system of Ishikawa in view of Majima and Way by having transfer function for each upper and lower branch because McBrien suggests that it is used for indicating the relationship between the applied modulation signal and the output intensity of Mach-Zehnder interferometer.

Regarding claim 13, Ishikawa in view of Majima, Fuse and McBrien discloses the upper and lower waveform components are substantially sinusoids (e.g. Fig. 2B and 2C, McBrien and Col. 23, lines 32-35, Ishikawa) divided by the transfer function of the upper and lower branches respectively (Col. 5, line 62-Col 6, line 5 or according to equation 6, Col. 7, lines 45-47, McBrien).

Regarding claims 14-17, Ishikawa in view of Majima, Fuse and McBrien does not explicitly disclose that the upper and lower waveform components are substantially sawtooth or triangular in shape. However, it is disclosed that the interferometer (e.g. Mach-Zehnder) generates narrow pulses (i.e. waveforms) and pulses having a predetermined shape (i.e. including sawtooth and triangular shape) for specific application (Col. 2, lines 3-11, McBrien) and that these components also depend largely on factors such as bias state, input signals, phase, delay and pulse format (Col. 1, lines 40-67, McBrien), it would have been a matter of design choice to employ upper and lower waveform components that are substantially sawtooth or triangular in shape. This support rational is based on a recognition that the claimed differences exist not as a result of an attempt by applicant to solve a problem but merely amount to selection of expedient known to the artisan of ordinary as design choice depending on the design. Also, the Examiner takes Official Notice that upper and lower waveform components that are substantially sawtooth or triangular in shape are extremely well-known and conventional in the art.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Fuse (U.S. Patent No. 6,512,619 b1) is cited to demonstrate a first and second modulator, optical filter and optical receiver for modulating frequency (i.e. wavelength) (Fig. 7 and 9). Gopalakrishman is cited to illustrate a first and second modulators (e.g. PM), a photonic input and an error detector for emitting error signal (Fig. 2). Roberts et al is cited to show a series of modulators having error detection and correction unit for identifying prone channels (Fig. 1

and 4). Watanabe is cited to show series of modulators, filters and detector apparatus for modulating multiplexed signal (Fig. 1, 4, 17-18). Maeda et al is cited to show QAM modulation, a series of modulators, and an error corrector for measuring error rate in light modulation (Fig. 1, 2 and 4). Kou et al is cited to show the sinusoid relationship between the relative phase shift between arms and intensity of optical output (Fig. 2). Fuerst et al is cited to show Mach- Zehnder modulators for modulating amplitude or phase (Fig. 1-6). Sanders is cited to show why sawtooth signal is chosen for optical phase modulators (Col. 8, lines 24-41).

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alex H Chan whose telephone number is (703) 305-0340. The examiner can normally be reached on Monday to Friday (8am to 6pm EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (703) 305-4729. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Alex Chan
Patent Examiner, AU 2633
November 28th, 2003

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